

PCT

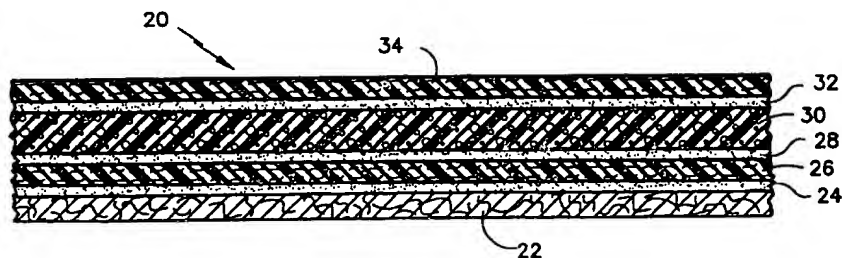
WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : B32B 5/22, B60R 13/02		A1	(11) International Publication Number: WO 99/46116 (43) International Publication Date: 16 September 1999 (16.09.99)
(21) International Application Number: PCT/US99/04414 (22) International Filing Date: 1 March 1999 (01.03.99) (30) Priority Data: 09/041,714 13 March 1998 (13.03.98) US (71) Applicant: UT AUTOMOTIVE DEARBORN, INC. [US/US]; 5200 Auto Club Drive, Dearborn, MI 48126 (US). (72) Inventors: BOYD, Stuart, G.; 3330 Deerwood Drive, North Street, MI 48049 (US). WOLF, Harold, G., Jr.; 3023 South Gibraltar Road, Gibraltar, MI 48173 (US). GEBRESE- LASSIE, Girma; 21180 Potomac Avenue, Southfield, MI 48076 (US). (74) Agent: DOIGAN, Lloyd, D.; UT Automotive Dearborn, Inc., Legal Dept., 5200 Auto Club Drive, Dearborn, MI 48126 (US).			(81) Designated States: JP, KR, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

(54) Title: HEADLINER MATERIAL WITH POLYESTER AND NON-POLYESTER LAYERS



(57) Abstract

A unique headliner includes a pair of spaced polyester fiber mat layers (26, 34). The polyester fiber layers (26, 34) are preferably felt layers which are needled and consist of a mixture of low and high melt polyester fiber pieces. The low melt fiber pieces are provided with an adhesive sheathing that melts at a low temperature to bond the fiber pieces together. The polyester layers are spaced on opposed sides of a polyurethane foam central layer (30). The combined headliner construction has good strength and acoustic characteristics.

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon	KR	Republic of Korea	PL	Poland		
CN	China	KZ	Kazakhstan	PT	Portugal		
CU	Cuba	LC	Saint Lucia	RO	Romania		
CZ	Czech Republic	LI	Liechtenstein	RU	Russian Federation		
DE	Germany	LK	Sri Lanka	SD	Sudan		
DK	Denmark	LR	Liberia	SE	Sweden		
EE	Estonia			SG	Singapore		

## BACKGROUND OF THE INVENTION

In particular, in one of the proposed polyester bats, the mats are formed of a mixture of low melt and high melt polyester fiber pieces. The low melt pieces are formed to have a polyester-based adhesive sheathing. Upon application of heat the adhesive melts and bonds the low and high melt fibers together. Such headliners are disclosed for example in co-pending Patent Application Serial No. 08/868,312.

For some headliner applications, the use of pure polyester materials might be somewhat limiting.

### SUMMARY OF THE INVENTION

5 In a disclosed embodiment of this invention, two layers of polyester fiber pieces are formed into a felt mat. A central foam core is positioned between the layers. The central foam core is formed of a plastic material other than polyester. The combination of the foam core and the polyester layers provide a very good headliner construction. The foam core is preferably a polyurethane foam. The  
10 combination of the polyurethane foam core and the outer polyester layers provides a strong I-beam construction increases the strength of the headliner, and also increases the acoustical performance. The headliner construction of this invention provides a clean and smooth surface which is substantially wrinkle-free.

In preferred embodiments of this invention, adhesive layers are placed  
15 between the polyester layers and the central foam layer. The layers may either be polyurethane-based adhesives or polyester-based adhesives. A decorative layer is positioned outwardly of one of the polyester layers to complete the headliner construction. In some applications, if necessary, additional layers may be inserted into the sandwich construction to provide additional strength.

20 The polyester mat layers are preferably of the type described above formed a combination of low melt and high melt fiber pieces.

These and other features of the present invention can be best understood from the following specification and drawing.

### **BRIEF DESCRIPTION OF THE DRAWING**

Figure 1 shows a headliner.

Figure 2 shows the several layers incorporated into the Figure 1 headliner.

### **5 DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT**

A headliner 20 is shown in Figure 1. As known, a headliner is positioned within the interior of the vehicle and must perform several challenging design features.

Figure 2 shows the headliner construction 20 incorporating an outer  
10 decorative layer 22. In a preferred embodiment, this decorative layer was approximately four millimeters thick and formed of a known foam such as may be available from Alpine Company.

An adhesive film 24 is positioned within the outer decorative layer 22. One  
acceptable film is available from Dow Chemical under its trade name 909 adhesive  
15 film. This film is about .002" thick.

A layer 26 is positioned inwardly of this adhesive layer, and is formed of a combination of low and high temperature melting polyester pieces. The polyester pieces are preferably needled and formed into a felt. The layer is preferably two to four millimeters thick. An adhesive layer 28 is shown having a thickness that is  
20 exaggerated for purposes of illustration. Layer 28 is formed of any one of several adhesives. In one embodiment, a polyester hot melt wet adhesive is rolled onto a central foam layer 30 prior to application of the polyester layers 26. The foam

layer 30 is preferably available from Foamax under its trade name 921 D. Layer 30 is preferably wider than layers 26 and 34, and in one embodiment was 6.5 mm.

The foam layer 30 is provided with another adhesive layer 32 on its other side at the same time. A second polyester layer 34 is then combined with foam layer 30 by layer 32.

In another embodiment, a polyester adhesive web may be used for layers 28 and 32.

Also, a polyurethane adhesive available from Reichhold under its trade name 2U010/22014 may be utilized. This is also a wet adhesive which is rolled onto the foam layer 30.

By utilizing the polyester layers 26 and 32 in combination with a central foam layer formed of a plastic other than polyester, several unique benefits are provided. The polyurethane combined with the polyester layers provides a strong I-beam construction, a good visual appearance, and very good acoustical properties.

The use of a polyurethane-based adhesive in particular provides a very strong connection between the polyurethane foam layer 30 and the polyester layers 26 and 34.

In a preferred embodiment of forming this invention, the foam layer 30 is initially provided with the wet adhesive on both faces. The polyester mats are then placed on those faces and they are inserted into a heated mold. The heated mold then compresses the layers together to form the headliner 20.

Preferably, the mold temperature is between 280°F and 340°F. Most preferably, the mold temperature is approximately 300°F. The mold time required

is typically 20 to 55 seconds, and may vary depending on the substrate weight and thickness. The compression of the material should be at least 1.0 millimeters, less than the starting thickness to ensure an adequate bond, between the several layers. Greater compression can be performed if necessary for specific thicknesses. The  
5 mold pressure is preferably less than 12 psi.

The present invention thus provides a headliner with a specific construction which achieves valuable functional benefits. A worker of ordinary skill in the art would recognize that certain modifications would come within the scope of this invention. For that reason, the following claims should be studied to determine the  
10 true scope and content of this invention.

CLAIMS

1. A headliner construction comprising:  
a central foam core formed of a plastic other than polyester;  
an inner and outer polyester layer formed of a plurality of polyester  
5 pieces formed into a felt mat; and  
adhesives based on either said first plastic or polyester placed  
between said foam core and said inner and outer polyester layers.
2. A headliner as recited in Claim 1, wherein said first plastic is  
10 polyurethane.
3. A headliner as recited in Claim 1, wherein said inner and outer  
polyester layers are attached by said adhesives directly to said foam core.
- 15 4. A headliner as recited in Claim 1, wherein said adhesives are  
polyurethane-based adhesives.
5. A headliner as recited in Claim 1, wherein said adhesives are  
polyester-based adhesives.  
20
6. A headliner as recited in Claim 5, wherein said adhesives are wet  
polyester-based adhesives.



7. A headliner as recited in Claim 5, wherein said adhesive is a polyester web adhesive.

8. A headliner as recited in Claim 1, wherein an outer decorative layer  
5 is attached to an opposed face of one of said polyester layers relative to said foam core.

9. A headliner construction comprising:  
an outer decorative layer;  
10 an adhesive binding said outer decorative layer to a first polyester layer, said first polyester layer being formed of a plurality of polyester pieces;  
said first polyester layer being positioned on one side of a central foam layer, said central foam layer being formed of polyurethane foam;  
15 a second polyester layer positioned on an opposed side of said foam layer from said first polyester layer formed of a plurality of polyester pieces.

10. A headliner construction as recited in Claim 9, wherein said foam layer has a thickness which is greater than the thickness of either said first or second  
20 polyester layers.

11. A headliner as recited in Claim 9, wherein said first and second polyester layers are spaced from said foam layer by intermediate adhesive layers.

12. A headliner as recited in Claim 11, wherein said adhesive layers are polyurethane-based adhesives.

13. A headliner as recited in Claim 11, wherein said adhesive layers are polyester-based adhesives.

1/1

FIG. 1

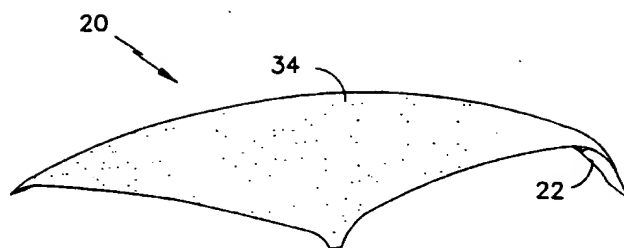
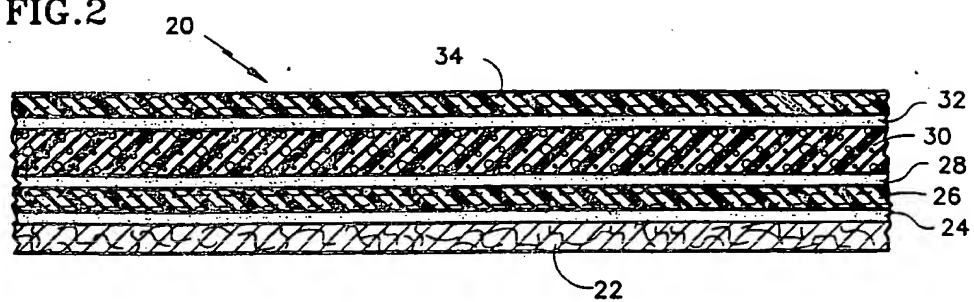


FIG. 2



# INTERNATIONAL SEARCH REPORT

national Application No  
PCT/US 99/04414

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 B32B5/22 B60R13/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 B32B B60R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 373 135 A (MONSANTO CO) 13 June 1990 (1990-06-13) claims 1,4 page 2, column 2, line 4 - line 9 page 3, column 3, line 11 - line 28 page 3, column 4, line 34 - line 51 page 4, column 5, line 23 - line 37 ---	1,3,5
Y	US 4 695 501 A (ROBINSON LEONARD W) 22 September 1987 (1987-09-22) claims 1,2,5 column 2, line 40 - line 46 column 3, line 32 - line 44 column 5, line 8 - line 14 column 5, line 56 - line 66 --- -/-	1,3,5

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

9 August 1999

Date of mailing of the international search report

18/08/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Girard, S

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 99/04414

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 419 439 A (MONSANTO CO) 27 March 1991 (1991-03-27) claims 1,6,7 example 1 ----	1,3,5
Y	WO 96 13377 A (INDIAN HEAD INC) 9 May 1996 (1996-05-09) claims 1,8-10,13 page 1, line 13 - line 16 page 6, line 28 - page 7, line 22 page 8, line 9 - line 30 page 10, line 26 - page 11, line 9 -----	1,3,5

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 99/04414

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0373135 A	13-06-1990	US 4851283 A	25-07-1989
		AT 136845 T	15-05-1996
		AU 609617 B	02-05-1991
		AU 3645689 A	07-06-1990
		CA 1302220 A	02-06-1992
		DE 68926283 D	23-05-1996
		DE 68926283 T	02-10-1996
		ES 2085289 T	01-06-1996
		GR 3020119 T	31-08-1996
		JP 2165942 A	26-06-1990
		MX 165306 B	04-11-1992
		PT 90926 A,B	29-06-1990
US 4695501 A	22-09-1987	CA 1243256 A	18-10-1988
		EP 0182810 A	04-06-1986
		JP 5028179 B	23-04-1993
		JP 61501837 T	28-08-1986
		WO 8504620 A	24-10-1985
EP 0419439 A	27-03-1991	AT 155737 T	15-08-1997
		AU 6257090 A	21-03-1991
		CA 2025509 A	19-03-1991
		DE 69031104 D	04-09-1997
		DE 69031104 T	22-01-1998
		JP 3110142 A	10-05-1991
		KR 9311146 B	24-11-1993
WO 9613377 A	09-05-1996	US 5549776 A	27-08-1996
		AU 3418495 A	23-05-1996
		US 5565259 A	15-10-1996